

V. RISK MODEL AND RISK-ADJUSTED HOSPITAL MORTALITY RATES—ALL QUARTERS DATA (1997-1999)

The **All Quarters** dataset represents a roll-up of all continuous quarters of data submitted by CCMRP participating hospitals for 1997 through 1999. Because it is based on more than one year's mortality outcomes for the majority of hospitals, the **All Quarters Analysis** should allow for improved precision in evaluating each hospital's "true" performance. This can be useful in assessing outcomes for relatively low volume hospitals, whose mortality experience tends to be more variable year-to-year (i.e., in making estimates from any period of data, the confidence intervals widen as the number of cases decreases).

As in the **1999 Analysis**, the **All Quarters** risk model is based on data submitted by 81 hospitals; although risk-adjusted results are presented only for the 70 hospitals that ultimately decided to publicly report their data. Like the **1999 Analysis**, all hospitals included in the **All Quarters Analysis** submitted a minimum of four quarters of data from 1999. Among the 81 hospitals included in the **All Quarters** risk model, 68 also submitted data from quarters prior to 1999. Among the 70 hospitals that are publicly reporting their results, 58 submitted more than four quarters worth of data.

Risk Model Development—All Quarters Analysis

The procedures and variables used to develop the **All Quarters** risk-adjustment model are exactly the same as those described for the **1999 Analysis**. The coefficients and odds ratios differ slightly from the 1999 risk model, as the **All Quarters** model is based on a larger number of cases (Table 6). Some of the coefficients of the variables that were not statistically significant in the **1999 Analysis** model become significant in the **All Quarters** model given the larger number of cases, which increases the power to detect differences. See the preceding section for a guide to interpreting the risk model.

Table 6: Logistic Regression Risk Model, All Quarters (1997-1999)

Explanatory Factor		Coefficient	Standard Error	p-value	Significance	Odds Ratio	
Intercept		-7.95	0.33	0.000	***		
Age (Years)		0.05	0.00	0.000	***	1.05	
Gender	Female	Reference Group					
	Male ^	-0.43	0.06	0.000	***	0.65	
Race	White ^	Reference Group					
	Non-White	0.14	0.07	0.055		1.15	
Creatinine (mg/dl)		0.21	0.03	0.000	***	1.23	
Congestive Heart Failure		Present	0.52	0.07	0.000	***	1.68
Hypertension		Present	0.15	0.07	0.030	*	1.17
Dialysis		Yes	0.24	0.21	0.261		1.27
Diabetes		Present	0.12	0.06	0.069		1.12
Peripheral Vascular Disease		Present	0.32	0.07	0.000	***	1.38
Cerebrovascular Disease		Present	0.28	0.08	0.000	***	1.32
Ventricular Arrhythmia		Present	0.37	0.10	0.000	***	1.45
COPD		Present	0.31	0.07	0.000	***	1.36
Operative Incidence	First Operation ^	Reference Group					
	Second Operation	0.77	0.09	0.000	***	2.16	
	Third or Higher	1.39	0.20	0.000	***	4.03	
Myocardial Infarction	None ^	Reference Group					
	Yes, but when unknown	0.18	0.18	0.308		1.20	
	21+ days ago	0.13	0.08	0.102		1.14	
	7-20 days ago	0.26	0.13	0.040	*	1.30	
	1-6 days ago	0.19	0.08	0.021	*	1.22	
	Within 1 day	0.84	0.12	0.000	***	2.33	
PTCA on this Admission		Yes	0.32	0.07	0.000	***	1.37
Angina	None	Reference Group					
	Stable ^	-0.26	0.11	0.017	*	0.77	
	Unstable	-0.05	0.10	0.641		0.96	
Acuity	Elective ^	Reference Group					
	Urgent	0.32	0.07	0.000	***	1.37	
	Emergent	1.12	0.10	0.000	***	3.08	
	Salvage	3.17	0.18	0.000	***	23.88	
Ejection Fraction (%)		-0.01	0.00	0.000	***	0.99	
Left Main Stenosis (%)	50% or less ^	Reference Group					
	51% to 70%	0.04	0.10	0.678		1.04	
	71% to 90%	0.34	0.10	0.001	**	1.40	
	91% or more	0.46	0.13	0.000	***	1.58	
Number of Diseased Vessels	Single Vessel	Reference Group					
	Double Vessel ^	0.13	0.17	0.427		1.14	
	Triple Vessel or more	0.36	0.15	0.020	*	1.43	
	None (Left Main Stenosis only)	0.47	0.34	0.167		1.60	
Mitral Insufficiency	None ^	Reference Group					
	Trivial	0.26	0.12	0.029	*	1.30	
	Mild	0.27	0.11	0.013	*	1.31	
	Moderate	0.46	0.15	0.003	**	1.59	
	Severe	0.70	0.32	0.028	*	2.02	

Note: ^ refers to the specific category used to replace missing data for each variable.

All Quarters Risk-Adjusted Rates

The **All Quarters** logistic regression model in Table 6 was used to develop risk-adjusted mortality results for the 70 hospitals that submitted continuous quarters of data between 1997 and 1999 and chose to publicly report their results. The number of quarters varies across hospitals, with a minimum of four (all of 1999) to a maximum of twelve (1997, 1998, and 1999). This variation is a function of when hospitals joined CCMRP and began submitting data on a continuous basis. Among the 70 hospitals, twelve began participation in 1999. As such, their All Quarters result will be virtually identical to their 1999 result. These twelve hospitals are noted with an asterisk in the tables below.

Among the 70 hospitals participating in public reporting, the **All Quarters** data includes a total of 1,048 in-hospital deaths out of 40,265 cases, reflecting an overall in-hospital death rate of 2.60%. This can be compared to a death rate of 2.20% in New York State for the 1997-1999 period (2002).

Key findings from the **All Quarters** analysis are:

- Given the larger number of cases for most hospitals, compared to the single year analysis, we are able to discern each hospital's performance with greater precision (i.e., the width of the confidence interval narrows around each hospital's estimate).
- Five hospitals performed significantly better than expected (Doctor's Medical Center-San Pablo, Heart Hospital of the Desert, Scripps Memorial Hospital-La Jolla, Summit Medical Center, and Sutter Memorial Hospital).
- Six of the 70 hospitals performed significantly worse than expected (Alta Bates Medical Center, Desert Regional Medical Center, Marin General Hospital, Memorial Medical Center of Modesto, Presbyterian Intercommunity Hospital, and Scripps Mercy).
- Fifty-nine of the hospitals performed no different than expected.
- A statistically significant relationship was found between the volume of cases and mortality outcomes.

Table 7 (sorted alphabetically) and Figure 4 (sorted alphabetically within region) display the performance results for each hospital. A guide to interpreting the tables can be found in the previous section. An additional column has been added to the **All Quarters** Results Tables and Figures: 1) **Participation Period** presents the number of quarters for which each hospital submitted data between 1997 and 1999. In addition, Figure 4 includes additional information regarding **Annualized Volume**—the average annual volume of isolated CABG cases for each hospital.

Table 7: Risk-Adjusted Results for CCMRP Hospitals, All Quarters (1997-1999), Sorted Alphabetically

Hospital Name	Participation Period	CABG Cases Submitted	Number of Observed Deaths	Number of Expected Deaths	O/E Ratio	Observed Death Rate	Lower 95% CI of Expected Death Rate	Expected Death Rate	Upper 95% CI of Expected Death Rate	Overall Performance Rating
Alta Bates Medical Center	Y97Q1-Y99Q4	372	15	8.66	1.73	4.03	0.88	2.33	3.78	Worse Than Expected
Alvarado Hospital Medical Center	Y97Q1-Y99Q4	445	22	16.72	1.32	4.94	2.06	3.76	5.45	No Different
CA Pacific Medical Center - Pacific Campus	Y98Q1-Y99Q4	348	10	10.13	0.99	2.87	1.24	2.91	4.58	No Different
Cedars-Sinai Medical Center	Y97Q1-Y99Q4	1220	28	33.59	0.83	2.30	1.88	2.75	3.63	No Different
Community Mem. Hosp. of San Buenaventura	Y98Q1-Y99Q4	390	8	6.59	1.21	2.05	0.43	1.69	2.95	No Different
Dameron Hospital	Y98Q1-Y99Q4	216	9	7.53	1.19	4.17	1.22	3.49	5.76	No Different
Daniel Freeman Memorial Hospital	Y98Q1-Y99Q4	329	8	9.15	0.87	2.43	1.07	2.78	4.49	No Different
Desert Regional Medical Center	Y98Q1-Y99Q4	255	14	5.93	2.36	5.49	0.52	2.32	4.13	Worse Than Expected
Doctor's Medical Center - Modesto	Y98Q1-Y99Q4	959	23	15.54	1.48	2.40	0.84	1.62	2.40	No Different
Doctor's Medical Center - San Pablo	Y97Q1-Y99Q4	250	3	9.73	0.31	1.20	1.66	3.89	6.12	Better Than Expected
Dominican Hospital	Y97Q1-Y99Q4	432	14	12.51	1.12	3.24	1.42	2.90	4.37	No Different
El Camino Hospital	Y98Q3-Y99Q4	157	4	6.38	0.63	2.55	1.54	4.07	6.59	No Different
Encino Tarzana Regional Medical Center	Y98Q1-Y99Q4	317	9	12.30	0.73	2.84	1.82	3.88	5.94	No Different
Glendale Adventist Med Ctr- Wilson Terrace	Y98Q4-Y99Q4	324	13	8.39	1.55	4.01	0.91	2.59	4.27	No Different
Glendale Memorial Hospital and Health Center	Y98Q1-Y99Q4	401	15	15.41	0.97	3.74	2.06	3.84	5.63	No Different
Granada Hills Community Hospital	Y97Q1-Y99Q4	213	6	3.97	1.51	2.82	0.06	1.86	3.66	No Different
Green Hospital of Scripps Clinic*	Y99Q1-Y99Q4	229	4	3.07	1.30	1.75	0.00	1.34	2.81	No Different
Heart Hospital of the Desert	Y97Q4-Y99Q4	218	1	6.49	0.15	0.46	0.81	2.98	5.15	Better Than Expected
Hoag Memorial Hospital Presbyterian	Y97Q1-Y99Q4	751	18	27.39	0.66	2.40	2.40	3.65	4.90	No Different
John Muir Medical Center	Y98Q1-Y99Q4	254	15	10.19	1.47	5.91	1.77	4.01	6.26	No Different
Kaiser Foundation Hospital - Los Angeles	Y97Q1-Y99Q4	3899	56	68.88	0.81	1.44	1.36	1.77	2.17	No Different

Table 7: Risk-Adjusted Results for CCMRP Hospitals, All Quarters (1997-1999), Sorted Alphabetically

Hospital Name	Participation Period	CABG Cases Submitted	Number of Observed Deaths	Number of Expected Deaths	O/E Ratio	Observed Death Rate	Lower 95% CI of Expected Death Rate	Expected Death Rate	Upper 95% CI of Expected Death Rate	Overall Performance Rating
Kaiser Foundation Hospital - San Francisco	Y98Q1-Y99Q4	2274	44	40.05	1.10	1.93	1.25	1.76	2.28	No Different
Kaweah Delta Hospital	Y97Q1-Y99Q4	964	19	27.17	0.70	1.97	1.83	2.82	3.81	No Different
Loma Linda University Medical Center*	Y99Q1-Y99Q4	402	6	11.58	0.52	1.49	1.31	2.88	4.45	No Different
Long Beach Memorial Medical Center	Y98Q1-Y99Q4	741	20	22.44	0.89	2.70	1.84	3.03	4.22	No Different
Marin General Hospital*	Y99Q1-Y99Q4	67	4	1.65	2.43	5.97	0.00	2.46	5.78	Worse Than Expected
Memorial Medical Center of Modesto	Y97Q1-Y99Q4	849	26	14.69	1.77	3.06	0.86	1.73	2.60	Worse Than Expected
Mercy Medical Center-Redding	Y98Q3-Y99Q4	328	11	12.00	0.92	3.35	1.74	3.66	5.58	No Different
Methodist Hospital of Southern California	Y97Q1-Y99Q4	710	21	16.18	1.30	2.96	1.21	2.28	3.35	No Different
Mission Hospital and Regional Medical Center*	Y99Q1-Y99Q4	237	6	4.62	1.30	2.53	0.22	1.95	3.67	No Different
Palomar Medical Center	Y97Q1-Y99Q4	464	17	12.39	1.37	3.66	1.26	2.67	4.08	No Different
Presbyterian Intercommunity Hospital	Y98Q1-Y99Q4	190	10	4.84	2.07	5.26	0.46	2.55	4.63	Worse Than Expected
Providence Holy Cross Medical Center*	Y99Q1-Y99Q4	106	2	3.73	0.54	1.89	0.34	3.51	6.69	No Different
Providence St. Joseph Medical Center*	Y99Q1-Y99Q4	192	4	4.80	0.83	2.08	0.35	2.50	4.65	No Different
Redding Medical Center	Y97Q1-Y99Q4	1555	20	27.90	0.72	1.29	1.15	1.79	2.44	No Different
Saddleback Memorial Medical Center	Y98Q1-Y99Q4	307	17	10.88	1.56	5.54	1.53	3.54	5.55	No Different
Salinas Valley Memorial Hospital	Y98Q3-Y99Q4	458	10	13.66	0.73	2.18	1.47	2.98	4.49	No Different
San Antonio Community Hospital	Y98Q1-Y99Q4	243	6	11.97	0.50	2.47	2.44	4.93	7.42	No Different
San Jose Medical Center*	Y99Q1-Y99Q4	66	2	1.61	1.24	3.03	0.00	2.44	5.95	No Different
Santa Barbara Cottage Hospital	Y98Q1-Y99Q4	533	15	11.80	1.27	2.81	1.00	2.21	3.42	No Different
Santa Monica - UCLA Hospital Med Ctr	Y98Q1-Y99Q4	103	4	5.07	0.79	3.88	1.00	4.92	8.84	No Different
Santa Rosa Memorial Hospital*	Y99Q1-Y99Q4	187	9	8.98	1.00	4.81	2.05	4.80	7.55	No Different
Scripps Memorial Hospital - La Jolla	Y97Q1-Y99Q4	1098	26	37.73	0.69	2.37	2.43	3.44	4.45	Better Than Expected

Table 7: Risk-Adjusted Results for CCMRP Hospitals, All Quarters (1997-1999), Sorted Alphabetically

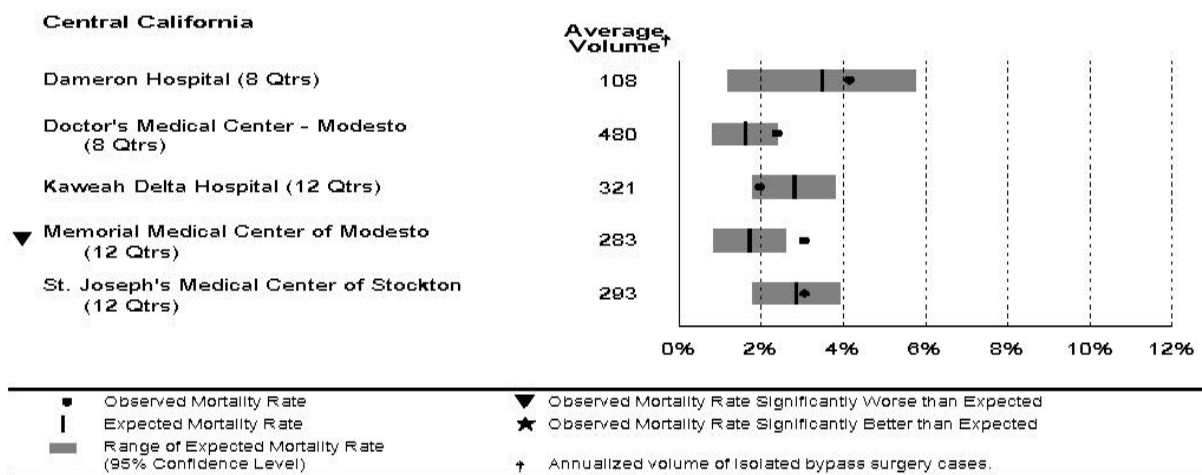
Hospital Name	Participation Period	CABG Cases Submitted	Number of Observed Deaths	Number of Expected Deaths	O/E Ratio	Observed Death Rate	Lower 95% CI of Expected Death Rate	Expected Death Rate	Upper 95% CI of Expected Death Rate	Overall Performance Rating
Scripps Mercy*	Y99Q1-Y99Q4	256	16	8.32	1.92	6.25	1.16	3.25	5.34	Worse Than Expected
Sequoia Hospital	Y97Q1-Y99Q4	717	25	28.04	0.89	3.49	2.58	3.91	5.24	No Different
Seton Medical Center - Heart Institute	Y97Q1-Y99Q4	1730	30	36.60	0.82	1.73	1.45	2.12	2.78	No Different
Sharp Chula Vista Medical Center	Y97Q1-Y99Q4	821	29	32.28	0.90	3.53	2.66	3.93	5.20	No Different
Sharp Grossmont Hospital	Y98Q1-Y99Q4	281	4	6.65	0.60	1.42	0.61	2.37	4.12	No Different
Sharp Memorial Hospital	Y98Q1-Y99Q4	555	16	12.95	1.24	2.88	1.12	2.33	3.55	No Different
St. Bernardine Medical Center	Y98Q2-Y99Q4	962	25	24.78	1.01	2.60	1.60	2.58	3.55	No Different
St. Francis Medical Center	Y98Q2-Y99Q4	158	4	6.24	0.64	2.53	1.04	3.95	6.86	No Different
St. Helena Hospital	Y97Q1-Y99Q4	680	18	21.36	0.84	2.65	1.88	3.14	4.40	No Different
St. John's Hospital - Santa Monica	Y97Q1-Y99Q4	403	11	11.62	0.95	2.73	1.36	2.88	4.40	No Different
St. Joseph Hospital - Orange	Y98Q1-Y99Q4	606	12	14.70	0.82	1.98	1.25	2.42	3.60	No Different
St. Joseph's Medical Center of Stockton	Y97Q1-Y99Q4	879	27	25.13	1.07	3.07	1.81	2.86	3.91	No Different
St. Jude Medical Center	Y98Q1-Y99Q4	497	17	11.31	1.50	3.42	1.05	2.28	3.50	No Different
St. Mary's Hospital and Medical Center - SF*	Y99Q1-Y99Q4	553	10	15.85	0.63	1.81	1.51	2.87	4.22	No Different
St. Vincent Medical Center*	Y99Q1-Y99Q4	282	9	7.93	1.13	3.19	0.94	2.81	4.68	No Different
Stanford University Hospital	Y98Q1-Y99Q4	490	17	12.04	1.41	3.47	1.12	2.46	3.80	No Different
Summit Medical Center	Y97Q1-Y99Q4	522	12	22.43	0.54	2.30	2.79	4.30	5.81	Better Than Expected
Sutter Memorial Hospital	Y97Q1-Y99Q4	2157	37	65.70	0.56	1.72	2.36	3.05	3.73	Better Than Expected
The Hosp. of the Good Samaritan - Los Angeles*	Y99Q1-Y99Q4	649	25	26.16	0.96	3.85	2.58	4.03	5.48	No Different
Torrance Memorial Medical Center	Y97Q1-Y99Q4	603	27	21.27	1.27	4.48	2.16	3.53	4.89	No Different
Tri-City Medical Center	Y97Q1-Y99Q4	627	11	15.13	0.73	1.75	1.26	2.41	3.56	No Different
UC Irvine Medical Center	Y98Q1-Y99Q4	164	3	4.41	0.68	1.83	0.30	2.69	5.08	No Different

Table 7: Risk-Adjusted Results for CCMRP Hospitals, All Quarters (1997-1999), Sorted Alphabetically

Hospital Name	Participation Period	CABG Cases Submitted	Number of Observed Deaths	Number of Expected Deaths	O/E Ratio	Observed Death Rate	Lower 95% CI of Expected Death Rate	Expected Death Rate	Upper 95% CI of Expected Death Rate	Overall Performance Rating
UCD Medical Center	Y98Q3-Y99Q4	228	6	5.70	1.05	2.63	0.58	2.50	4.42	No Different
UCLA Medical Center	Y98Q1-Y99Q4	367	15	11.47	1.31	4.09	1.47	3.12	4.78	No Different
UCSF Medical Center	Y98Q1-Y99Q4	275	12	7.69	1.56	4.36	1.00	2.80	4.60	No Different
USC University Hospital	Y97Q1-Y99Q4	249	10	6.00	1.67	4.02	0.54	2.41	4.27	No Different
Washington Hospital - Fremont	Y97Q1-Y99Q4	502	27	27.03	1.00	5.38	3.63	5.39	7.14	No Different

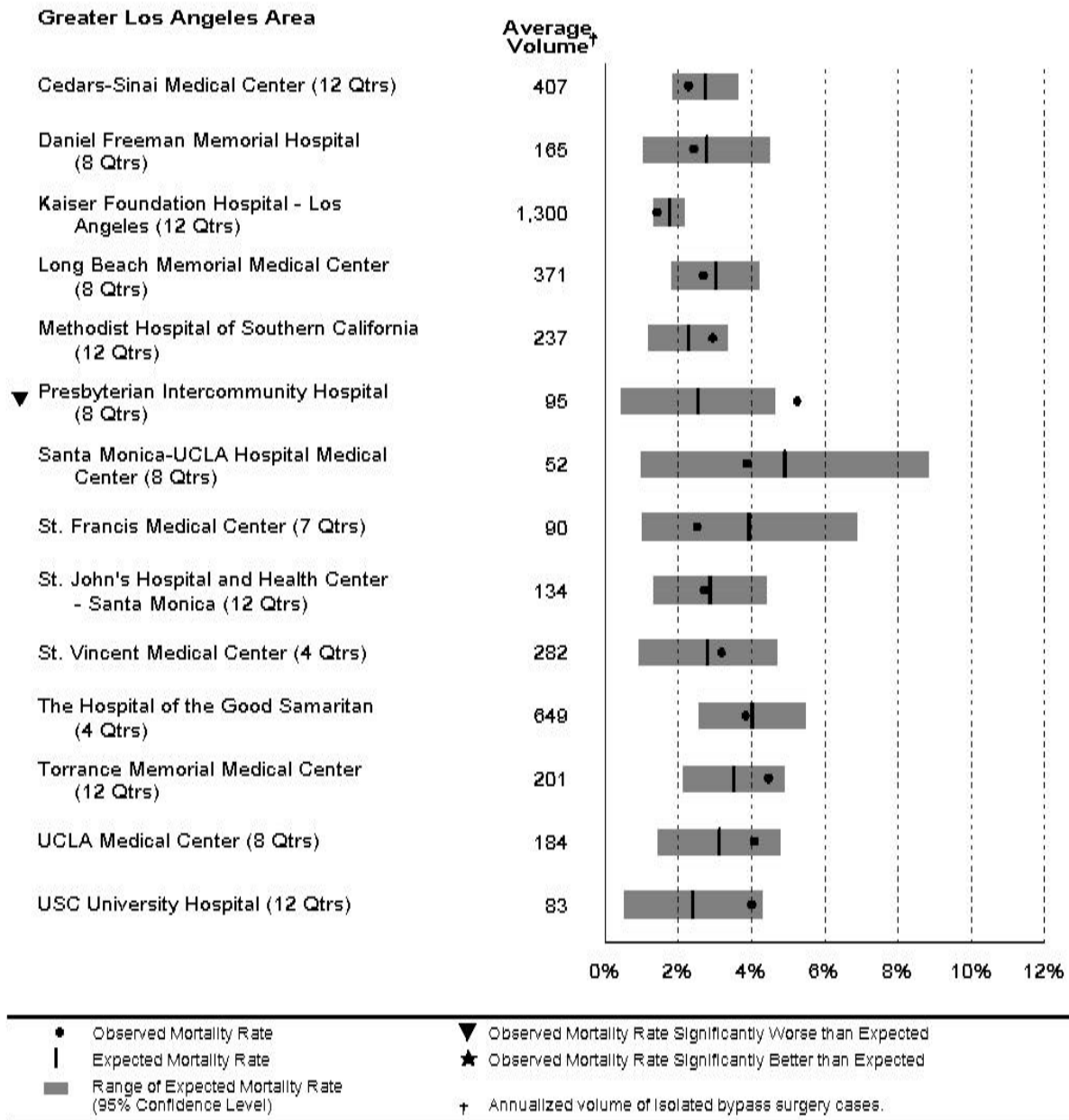
*An asterisk denotes hospitals that began participation in 1999. Their All Quarters result thus represents only four quarters of data.

Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(in Alphabetical Order by Geographic Region)



NOTE: The following hospitals in this region declined to participate:
 Bakersfield Memorial Hospital, Fresno Community Hospital and Medical Center,
 Marian Medical Center, San Joaquin Community Hospital, St. Agnes Medical Center.

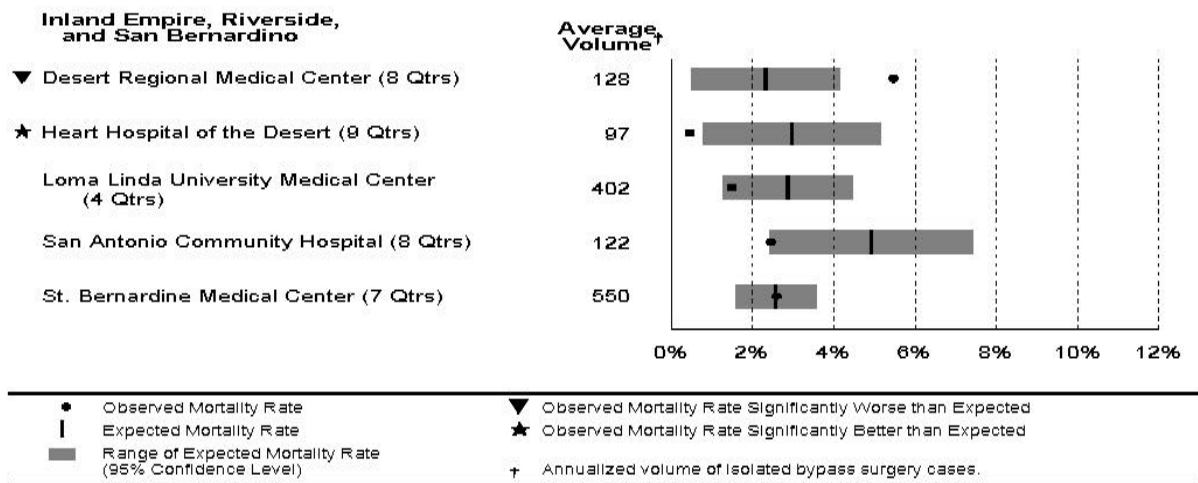
Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
 (cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

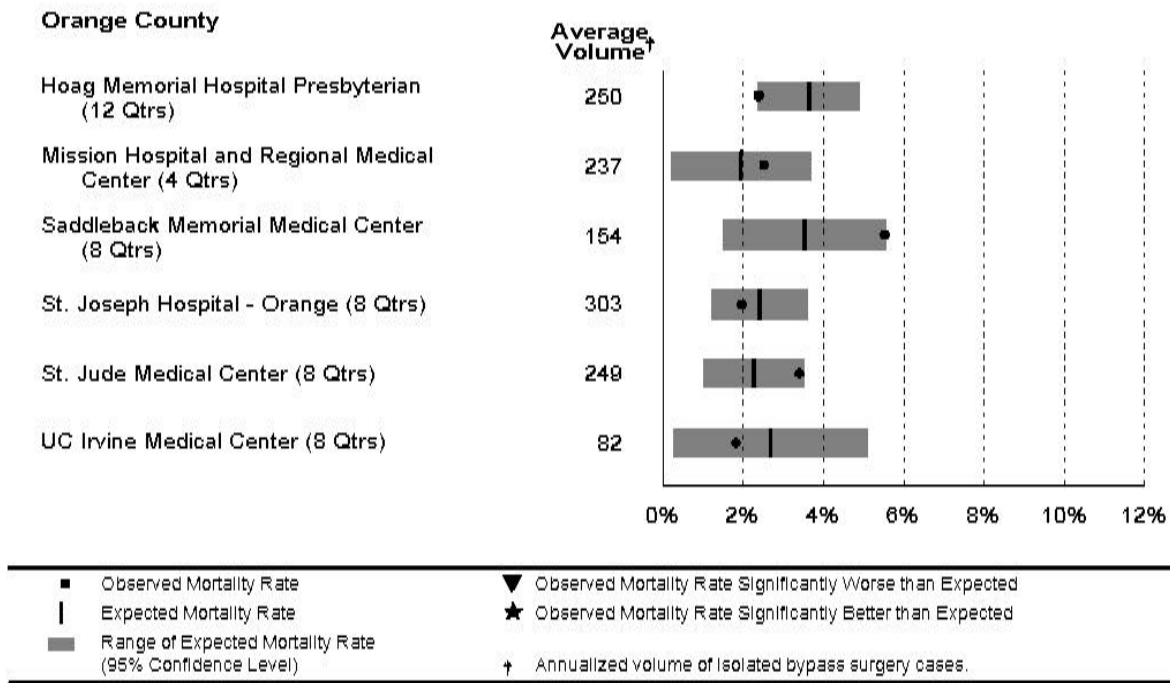
Beverly Hospital, Brotman Medical Center, Centinela Hospital Medical Center, Downey Community Hospital, Garfield Medical Center, Huntington Memorial Hospital, Intercommunity/Citrus Valley Medical Center, LA County, Harbor-UCLA Medical Center, LA County/USC Medical Center, Lakewood Regional Medical Center, Little Company of Mary, St. Mary's Medical Center - Long Beach, White Memorial Medical Center.

Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:
 Eisenhower Medical Center, Pomona Valley Hospital and Medical Center,
 Riverside Community Medical Center, St. Mary's Regional Medical Center.

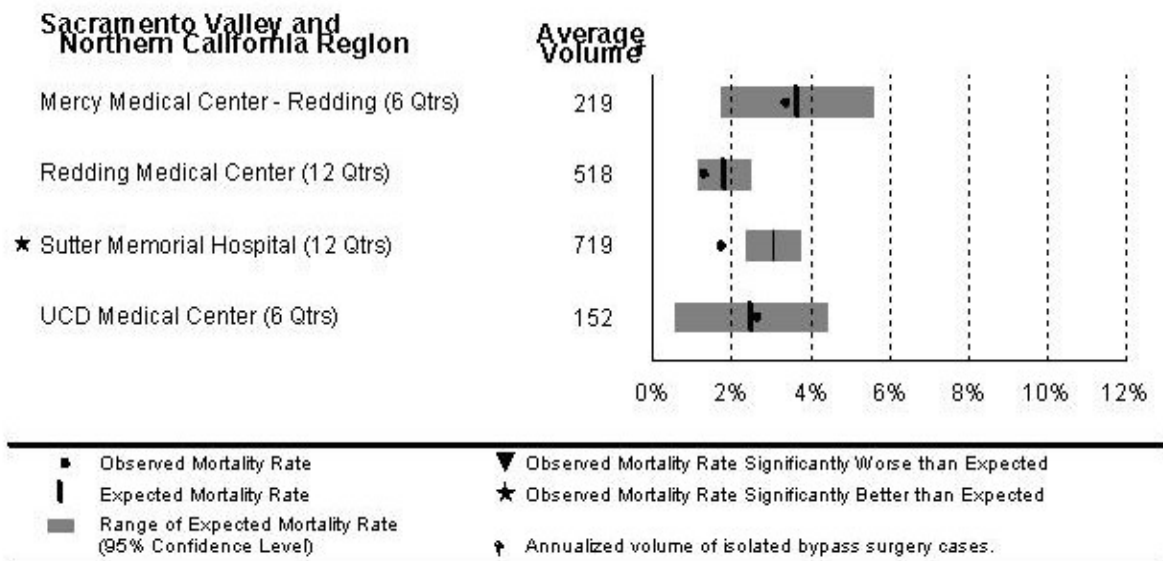
Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
 (cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

Anaheim Memorial Medical Center, Fountain Valley Regional Hospital,
 West Anaheim Medical Center, Western Medical Center - Anaheim,
 Western Medical Center - Santa Ana.

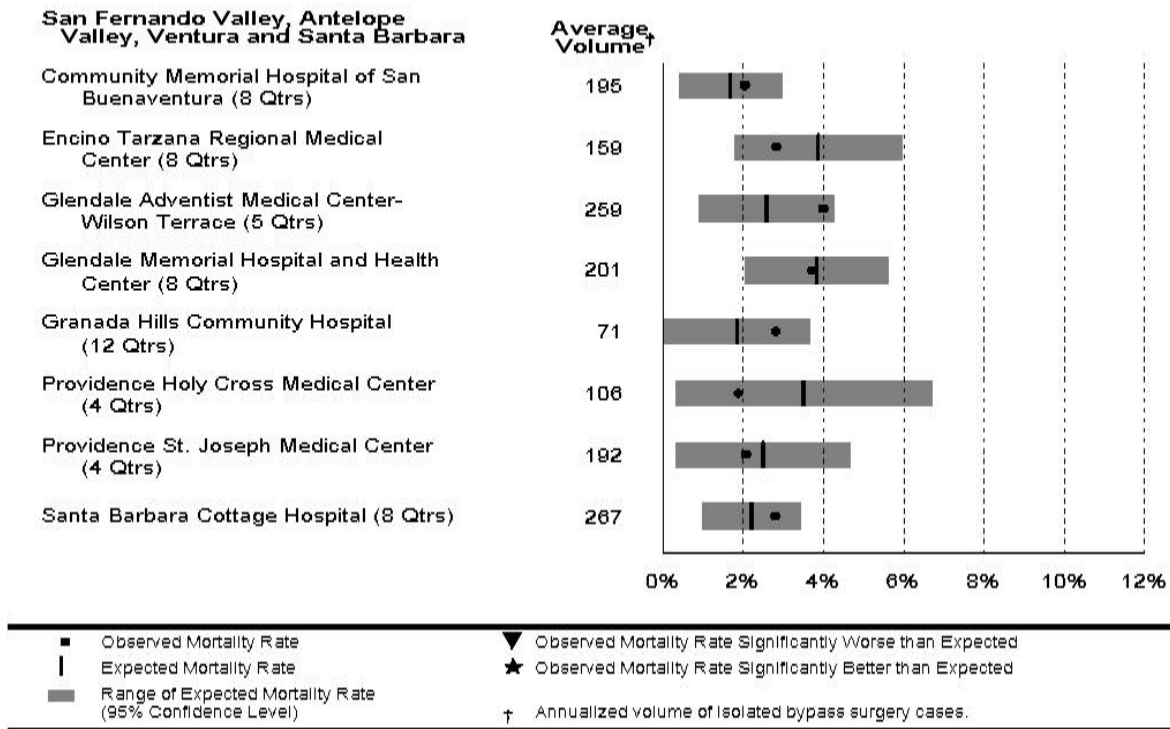
Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

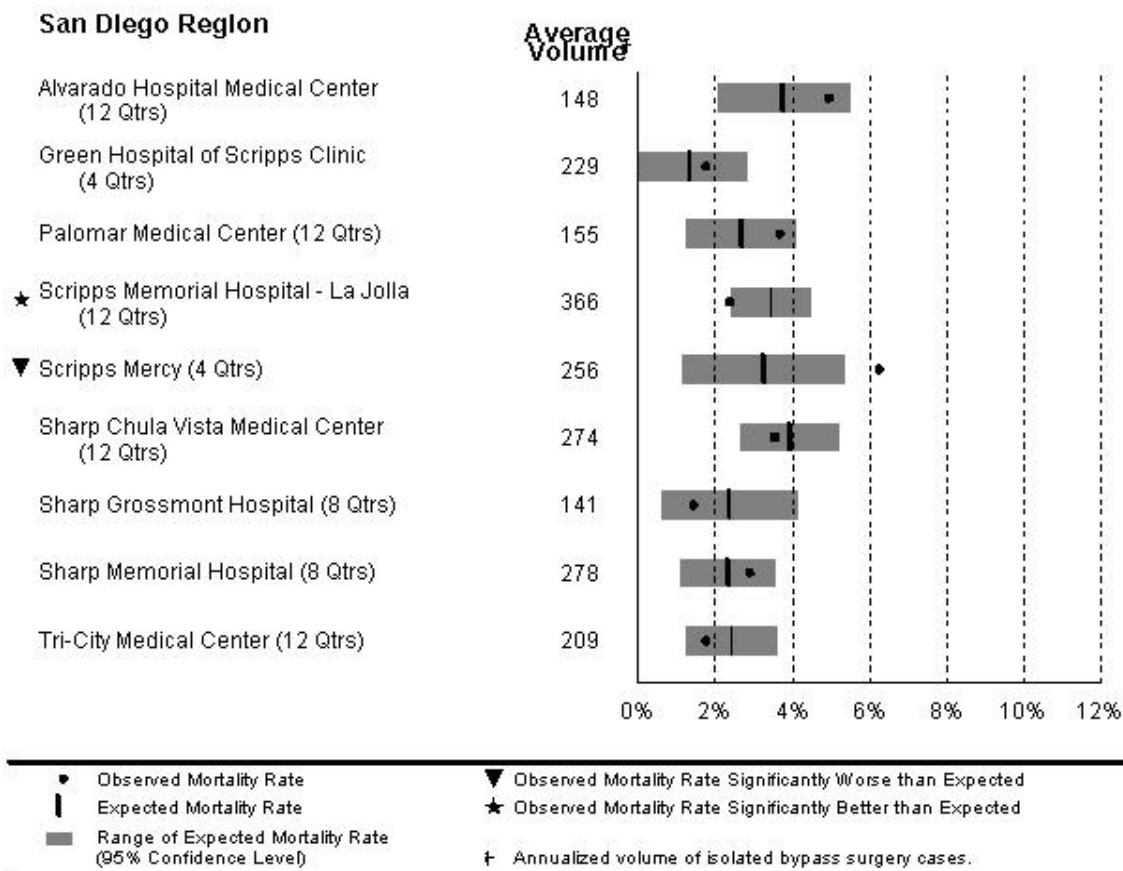
Enloe Medical Center, Mercy General Hospital, Mercy San Juan Hospital.

Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:
 Antelope Valley Hospital Medical Center, French Hospital - San Luis Obispo,
 Lancaster Community Hospital, Los Robles Regional Medical Center,
 Northridge Hospital Medical Center, St. John's Regional Medical Center - Oxnard,
 Valley Presbyterian Hospital, West Hills Regional Medical Center.

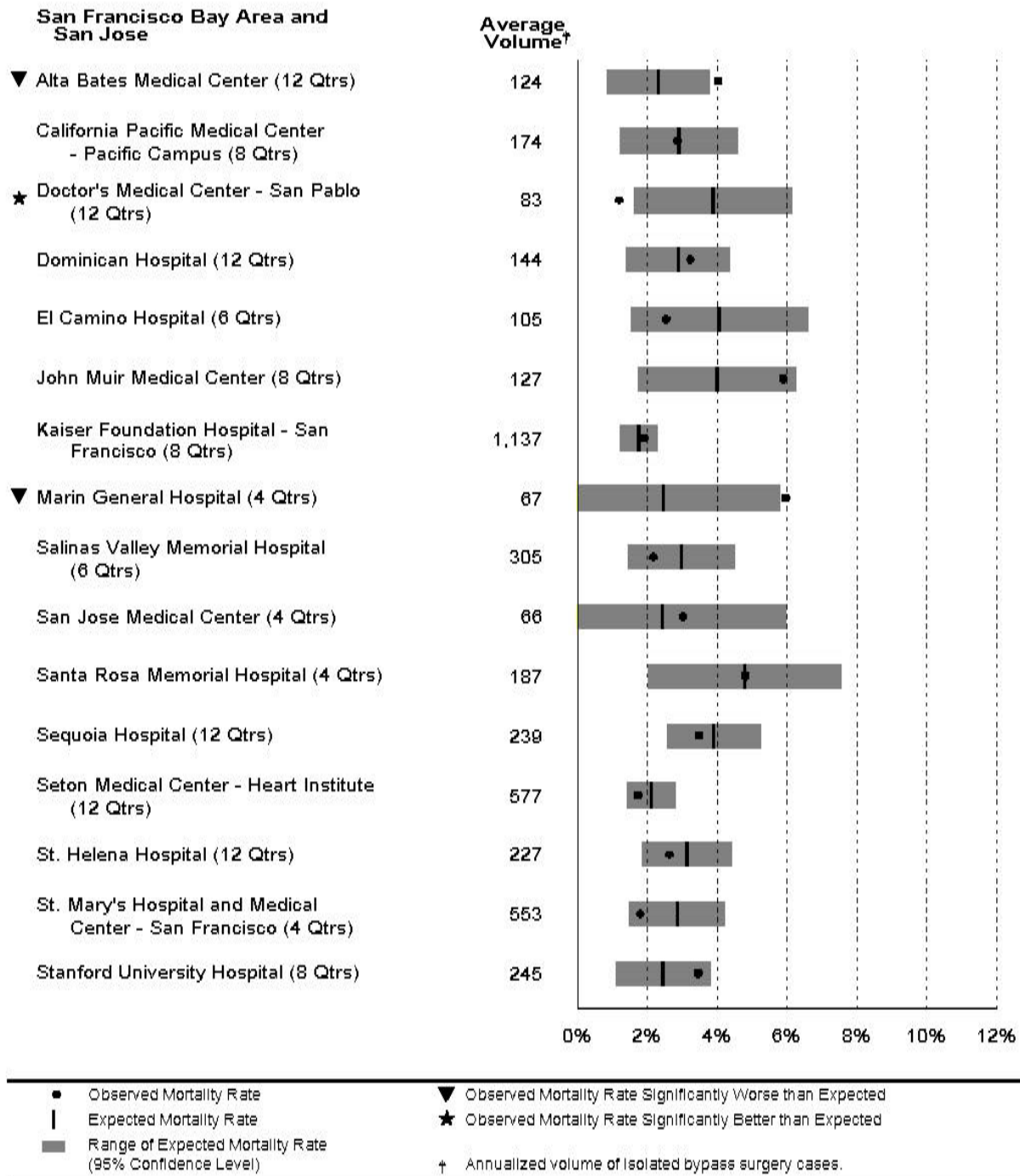
Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

UCSD Medical Center - Hillcrest, UCSD Medical Center - Thornton.

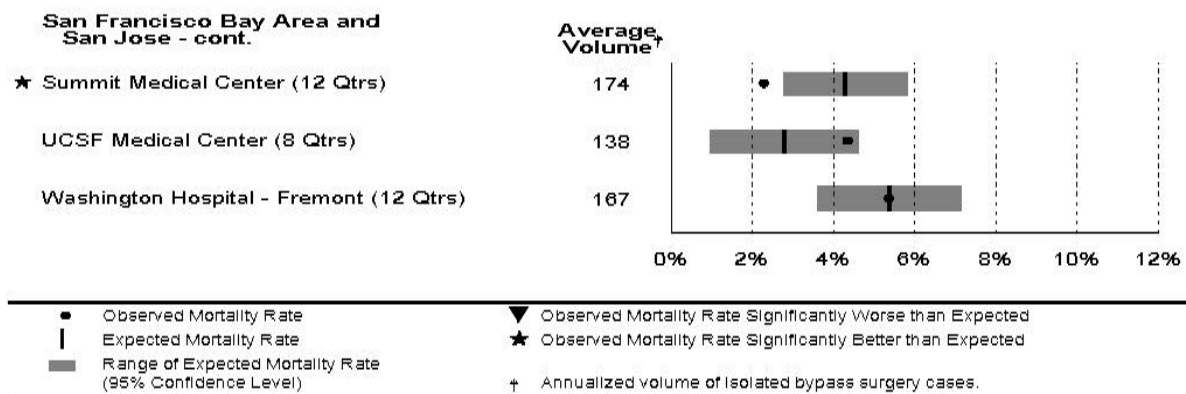
Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

Good Samaritan Hospital - San Jose, Mt. Diablo Medical Center, O'Conner Hospital, Queen of the Valley Hospital, Santa Clara Valley Medical Center, Mills-Peninsula Hospital.

Figure 4: Comparison of Observed to Expected Mortality Rate, 1997-1999
(cont.) (in Alphabetical Order by Geographical Region)



NOTE: The following hospitals in this region declined to participate:

Good Samaritan Hospital - San Jose, Mt. Diablo Medical Center, O'Conner Hospital, Queen of the Valley Hospital, Santa Clara Valley Medical Center, Mills-Peninsula Hospital.